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Enoch, Marcus P.. 2019. "Lessons from America - the San Diego HOT Lane". figshare.
<https://hdl.handle.net/2134/3425>.

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Lessons from America – the San Diego HOT lane

Marcus Enoch reports from San Diego where the High Occupancy Toll Demonstration Project has won support from drivers. He asks whether there are lessons to be learnt as Local Authorities in the UK wonder how to sell congestion charging to the local community.



With local authorities throughout the developed world facing increasing levels of congestion, and with less reliable petrol tax revenues under threat for a variety of reasons, the hunt is on for effective ways to limit traffic growth and raise money for transport improvements. In theory, the 'best' solution is to charge motorists for the congestion they cause. This provides a double impact. Firstly, it prices some motorists out of their cars, or at least encourages them to drive in a less sensitive area; secondly, it raises revenue that can be spent on improving transport alternatives – a win-win situation for politicians, planners and the public.

But in practice, this is not how road user charging is perceived. Instead, policy makers have tended to shy away from implementing such a controversial and even unpopular 'solution' in all but a very few cases. Thus Mayor Ken Livingstone's pricing proposal for central London is very much an experiment, not only as to whether the scheme will technically work, but also in how to convince the public that the idea is a good one.

THE SAN DIEGO HOT FACILITY

One of these relatively few examples of congestion charging in action that has not only overcome this political and public resistance, but turned it into support, is the High Occupancy Toll (HOT) lane facility in San Diego, California.

Originally opened in 1988 as a High Occupancy Vehicle lane to buses, van pools and two-person carpools by Caltrans, the California Department of Transportation, the two-lane expressway is unusual in that users are physi-

cally separated from the general purpose lanes by concrete barriers. In addition, drivers can only enter and exit the lanes at a single point in each direction, with access controlled through a ramp metering system - which also gives priority to high occupancy vehicles. The HOT lanes currently run for eight miles in the median of Interstate 15 between State Route 56 and State Route 56 to the north of San Diego, California, and are reversible. The lanes operate in the peak-flow direction - i.e. north to south in the morning and south to north in the evening, and are managed by contractor TransCore. Such a configuration proved ideal when in December 1996 the site became a demonstration project for the High Occupancy Toll lane concept.

The proposal that single occupancy vehicles (SOVs) be allowed to enter the lanes on payment of a toll was actually first suggested in 1991, as only 50% of the two lanes' capacity was being used while adjacent general-purpose lanes were experiencing severe congestion during peak periods. Local councillor and member of the San Diego Metropolitan Transit Development Board, Jan Goldsmith, thus suggested charging a toll on a section of the HOV lane to fill up excess capacity. Revenue raised from this could then be spent on improvements to public transport services between his district and Downtown San Diego. Now an Assemblyman in the California State Legislature, Goldsmith has not yet seen his hoped for extension to the city's light rail system, although the money has led to an improved express bus service. Interestingly, buses operating on this service are painted red (like the light rail vehicles and unlike the local buses), ostensibly to prepare drivers for the sight of red LRVs in the future.

In the event, the project only se-

cured funding at the second time of asking in 1995. Eight million dollars was initially put up by the Federal Highway Administration (FHWA) under the Congestion Pricing Pilot Program of the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) for a three year experimental project to determine how drivers reacted to being charged on a per trip basis. In addition, the San Diego Association of Governments (SANDAG) contributed \$2m, and the Federal Transit Administration \$230,000. In the autumn of 1999 the experiment was extended until 2002 by California State Bill 252, and State Bill 313 of 2001 seeks to remove this time limit altogether.

HOW THE TOLLING WORKS

Initially, a very simple payment system was used, with users paying \$50 for a windshield permit that was valid for a month. This was superseded in March 1998 by the FasTrak system which charges users on a per-trip basis, with fees deducted from a pre-paid account. This is made possible by the use of transponders which single occupancy vehicles are required to have attached to their windshields with a Velcro strip, in order to aid enforcement, by the time they pass under the toll gantry which is located roughly midway along the facility.

To join the scheme, a \$40 deposit is required to obtain a transponder, although this fee is waived for credit-card account holders. Billing for tolls is quarterly. Cash and cheque account holders must maintain a minimum account balance of \$20, after which a request for a minimum \$50 cheque or money order replenishment is sent. For credit card holders the account is re-

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plenished automatically when the balance falls to \$10.

As drivers approach the HOT lane, variable message signs advise them of the toll to use the lanes. The level of this toll depends on how much spare capacity is available in the HOV lane, and varies from 50 cents to \$4 in normal circumstances¹, with drivers paying more the busier the lanes². The toll is calculated in this way in order to conform to California law, which requires that express lanes must be free flowing at all times, although this means drivers may elect to pay when the general purpose lanes are clear. To overcome this, signs providing information on the level of congestion in the general purpose lanes were briefly considered, but rejected. This was because users actually perceive the time savings of the HOT lane to be far greater than they actually are, a misconception thought worth maintaining.

This system produced a problem of how to exempt cars with two or more people from the toll. The solution is that users are issued with a silver static bag into which they put the transponder. The potential abuse of such a simple arrangement is addressed by the enforcement method.

ENFORCEMENT

Given that vehicles can legally use the lane by paying the toll or by carrying more than one person, enforcing the lanes has been a challenge. Several methods have been tried, including infra-red and video. In practice, the most reliable method has proved to be visual identification of offenders by the California Highway Patrol. This is coupled with the use of an electronic monitor by CHP officers to tell if a vehicle occupied only by the driver is a qualified motorist who has paid the toll. CHP officers sign up for overtime to enforce the HOT lane.

Penalties for offenders are strict. First offences lead to a fine of \$271, second offences double that, and if caught a third time drivers lose their license. Perhaps as a consequence, compliance figures are good - surveys show that only 2-5% of ineligible drivers violate the lanes.

PERFORMANCE

Since the demonstration project began in December 1996, the number of daily carpools using the Express Lanes has increased from 7,700 to



As drivers approach the HOT lane variable message signs advise of the toll to use the lane.

Seventeen thousand transponders have been issued following the introduction of the pay-by-trip scheme in March 1998.

13,500, and overall daily traffic on the lanes has grown from 9,400 to 17,500 vehicles per day. Approximately 25% (4,000) of the daily users are SOV fee-paying customers. Seventeen thousand transponders have been issued following the introduction of the Fast-Trak pay-per-trip element of the scheme in March 1998.

Around \$430,000 of the annual \$1.6m toll revenue covers operating costs, and \$60,000 pays the California Highway Patrol to enforce the lanes. State law requires the remaining money to be spent on developing the express lanes and improving the public transport service along the corridor, specifically, the express bus service known as the Inland Breeze which began operating in November 1997.

Use of the bus service has been lower than originally predicted, although it has been steadily growing.

On average, 619 riders per day used the service in the first six months of 2000, compared with 495 riders per day throughout 1999. Perhaps surprisingly, most of the trips have been made in the reverse commute direction.

Actual time savings average around eight minutes, but are perceived as being closer to half an hour. This could be due to drivers placing a high value on the reliability and stress free nature offered by 'guaranteed' free-flow driving conditions versus an uncertain amount of time spent in congested and potentially stressful circumstances. It is also likely that drivers factor in this reliability when deciding when to leave home. Research has shown that many drivers actually decide to use the lanes before they leave home, enabling to spend an extra half an hour or so before they set off on their journey. Thus in prac-



An express bus service, known as the Inland Breeze, operates along the corridor. Use of the service is growing steadily although, surprisingly, most of the trips have been made in the reverse commute direction.

tice the time savings to users is greater than that simply achieved by the express lanes alone.

Overall, the facility has proved popular with users, while non-users are ambivalent. One reason is that in using the facility, drivers actually have a choice of whether to share their car, whether to pay the toll, or whether to sit in the congested general purpose lanes. While initially there were concerns that the lanes would become 'Lexus Lanes' - i.e. only used by the rich - this has not been borne out in practice. The majority of drivers use the lanes occasionally, and with the toll money being very clearly earmarked to improve public transport between areas along the corridor and downtown San Diego, the majority of those asked now think the scheme is fair.

Advocates of HOV lanes too are happy, as HOV lanes running at capacity makes calls for their removal redundant.

FUTURE DIRECTION

Should the facility receive the necessary funding - around \$100m is required - and political support, the goal is to expand the current facility by increasing the number of managed lanes and by increasing the overall length, while the number of access and exit ramps is also to be increased. Currently, average daily traffic flow (ADT) is 170,000 to 295,000 vehicles,

with daily commuter delays ranging from 30-45 minutes. Interstate 15 is also susceptible to additional delays during bad weather, incidents or special events, due to a lack of any parallel routes. By 2015 under a 'business as usual' scenario with increased development along the corridor - forecasts suggest one million extra people will live in San Diego by 2020 - volumes of 350,000 ADT, and 80-120 minute delays are predicted.

This project is to be conducted in three phases, although the order of these has yet to be decided. Essentially, it is intended to:

- extend the lanes to the north to Escondido, increasing the total length of the Managed Lanes to 20 miles;
- increase the number of HOT lanes from two to four, by converting one of the four general purpose lanes in each direction. Movable barrier technology would then be used to provide three lanes for peak traffic, and one lane for off-peak for the existing lanes; and
- increase the number of HOT lanes from two to four, using a movable barrier system to generate three lanes for peak traffic, and one lane for off-peak for the newly extended section.

In line with the modifications to the managed lanes, the partners are seeking to develop a Bus Rapid Transit system along the corridor. This system is intended to deliver rail service quality to the passenger with bus flexibility to the operator - staged construction being a particularly important attribute in this regard - and would see five Bus Rapid Transit interchange stations and park-and-ride sites located very close to access/exit ramps along the route.

More strategically, SANDAG is seeking to update its HOV and managed lane plan for the region and integrate it with the needs of the public transport network.

LESSONS FROM SAN DIEGO

There are several crucial lessons that can be drawn from the project.

Crucially, drivers are offered a genuine and informed choice - they can use the general purpose lanes for free with the likelihood of being delayed, or else they can pay but enjoy a hassle free and predictable journey time. This is a major factor missing from area charging schemes.

Revenue from the project is very clearly hypothecated to paying for improved public transport along the corridor - offering drivers an alternative

and releasing some road space to the benefit of everyone else.

One key reason that the scheme was implemented in the first place, and why it has lasted as long as it has been the presence of a political champion from the scheme's conception at a local level through its survival and eventual acceptance at the State Assembly level.

The project was introduced in stages as the technology developed - from monthly pass to pay per trip - allowing drivers to adjust. Drivers were also kept well informed by a special newsletter, detailing what and why changes were being made.

The project was, and still is, very simple, with only one access and exit ramp. Designers of the scheme are not yet sure how the charging structure might work. No decision has yet been made as to whether drivers would pay for the time spent or distance travelled in the lanes, or if there would be a flat fee dependent on the capacity of the lane as at present.

SO HOW MIGHT SUCH A SCHEME WORK ELSEWHERE?

With the success of the HOT scheme, the concept of paying to travel on toll roads is slowly becoming more accepted across California. FasTrak transponders can now be used to pay for trips on several routes including the San Joaquin Hills Transportation Corridor (SR 73), Foothill Toll Road (SR 241), Eastern Toll Road (SR241), the 91 Express Lanes, and the Golden Gate Bridge in San Francisco.

In terms of transferability to Britain, perhaps the striking result from the San Diego case, is that Californians at least, are now willing to pay for using highways. This, despite the huge pressure in the United States against urban road pricing, parking charges or increases to the price of petrol.

By contrast in Britain, the opposite seems to be true. While the idea of paying to use motorways has provoked massive hostility - for example the controversy engendered by the Birmingham Northern Relief Road - Londoners are largely resigned to the reality of the Congestion Charge. This is no mean achievement, and is largely due to London Mayor Ken Livingstone applying some of the principles of political leadership, public consultation, promised use of the revenue etc., applied in the San Diego case. However, would this have been achievable had the transport situation

in London not been in desperate crisis?

Extending road user charging to other towns and cities may require the flexibility of adopting different schemes that can offer a different package of benefits and conditions. As yet, San Diego-style two-lane HOT expressways in the centre of motorways is one option that has not received much attention in Britain, although it could be a useful way of realising the benefits of motorway congestion charging in a politically acceptable way. Such a scheme implemented on motorways into London or Birmingham for example, would increase peak capacity by encouraging people to car share and travel by bus and coach. It would also raise revenue to help subsidise the improvements, and may well relieve some of the capacity problems on the commuter rail services.

Acknowledgements

This paper was primarily based on interviews with Brian Pessaro of SANDAG, Dave Schumacher of the Metropolitan Transit Development Board,



The most effective method of enforcement has proved to be visual identification of offenders by the California Highway Patrol.

and independent consultant Eric Shreffler of San Diego in June 2001. Results from the San Diego Association of Governments website (www.sandag.com), and from the State of California Legislature are also reported.

Notes

1. As of July 2001, the maximum \$8 charge has been introduced only once, when there was a severe accident in the

general purpose lane the day before the Thanksgiving Holiday on 24th November 1999.

2. The traffic flow in the express lanes is measured using loop detectors in six minute counts. The toll is then calculated using an average of two six minute counts, which is displayed on the entry sign to the lanes. A delay function in the algorithm then ensures that the toll the motorist sees on the sign and the amount the motorist is charged at the gantry are the same.



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